

Rocket Combustion Diagnostics Laboratory (Cell 32)

The Rocket Combustion Diagnostics Laboratory (Cell 32) is shown in figure 10. The cell is currently under construction and will be completed by mid-1993. The facility will initially be used to verify combustion stability models.

The cell is designed for test-firing gaseous hydrogen/liquid oxygen or gaseous hydrogen/gaseous oxygen rocket engines at thrust levels to 2000 lbf for short-duration performance characterizations. The propellant systems are supplied from gaseous hydrogen and gaseous oxygen tube trailers of 70 000 and 50 000 SCF capacity, respectively. Liquid oxygen will be supplied from a 50-gal tank with a working pressure of 1800 psig.

Data capabilities include a high-speed data acquisition system (150 channels) with an overall digitizing rate of 600 000 samples per second and a low-speed data acquisition system (111 channels) with a record rate of approximately 80 samples per second. A programmable logic controller is used to control the test operations.

Several ports for optical access are located in the main blast wall which separates the test cell from the laser room. This arrangement will allow the use of laser diagnostic equipment to study complex flow phenomena. A phase Doppler droplet analyzer (PDDA) will measure injector spray droplet size and study velocity characteristics. A laser Doppler velocimeter (LDV) will measure the velocity of droplets and particles in the flow stream. A copper vapor laser flow visualization system will provide qualitative and quantitative flow data. A laser spectroscopy system is planned for the future.

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